of total heats, for example, rather than their absolute amounts.

Prof. Mollier, of Dresden, in 1906 published tables and sheets of curves calculated on Callendar's methods, and these were published by Sir J. A. Ewing in the third edition of his book on the steam engine in 1910. Prof. Smith and Mr. Warren have recalculated all the numbers (with slight divergences from Mollier's results), using values of the constants which seem to them best, and they reproduce Prof. Mollier's curves showing total heat on an entropy base. They give both Centigrade and Fahrenheit tables. If Prof. Callendar's methods are right there can be no doubt that Prof. Smith and Mr. Warren have done a great service to steam engineers. They nowhere state what is their unit of heat, but it is probably that which agrees with $J = 1399$ or 1400. This will not agree with their figures for the total heat of water. It is also a pity that they do not give the actual experimental results on which their calculations are based; no doubt great weight is given to the Joly-Callendar value of L at 100° C., and to Callendar's specific heat as well as the Munich results.

Fair agreement of the steam tables with measured values of L, &c., is no proof that Prof. Callendar's method is legitimate, because good agreement may be effected even if we take c to be a constant, b being the volume of water, or, indeed, if we take steam to be a perfect gas. The only real test would be that the calculated specific heat for various temperatures and pressures should agree with measured values. This test cannot be applied until we have better experimental results. J. P.

PRACTICAL AGRICULTURAL CHEMISTRY.

Practical Agricultural Chemistry. By Prof. S. J. M. Auld and D. R. Edwardes-Ker. Pp. xxiv + 243. (London: John Murray, 1913.) Price 5*s.* net.

UNTIL recently the teacher of agricultural subjects in this country suffered from the disadvantage (or advantage if one looks upon it in that light) that very few text-books were available to help him in his teaching. The result was that each man had to devise his own course and modify it as time went on and experience accumulated. There is a tendency at the present time for teachers to put their courses on record, and the plan has much to commend it.

The latest scheme thus printed is the laboratory course for students of agricultural chemistry used by Dr. Auld and Mr. Edwardes-Ker. It opens with a good section on plant-life which is distinctly fuller than usual, including experiments with certain plant constituents not commonly studied in other laboratories. The teacher will find material here that may be new to him and that he may advantageously embody in his own course. The section on soils presents few novel features; indeed, there are some directions in which marked improvements might be made. Above all things, it is necessary to be clear in dealing with the agricultural student. But we find that on p. 86 the "clay" in soil is estimated by a method which will bring out particles less than 0·002 mm. in diameter; on p. 90 by a method which brings out particles less than 0·01 mm. in diameter; while on p. 62 a scheme of classification of soils is given which supposes that "clay" is something altogether different from either. Yet there is no hint that the word is being used in three different senses. The precise definition of clay must be a matter of convention; it is much better for the young student to begin on the British convention and defer the detailed study of other conventions until he is more advanced in the subject.

We should like also to have seen some of the newer and improved methods of analysis brought in. The Neubauer method of examining soil extracts, and the titration method for determining phosphates, are much simpler and quicker than those given, while the perchlorate method of estimating potassium is at least as accurate as, and much cheaper and more convenient than, the costly and cumbersome platinum method. These, however, are essentially matters of detail, and as the authors have shown courage in introducing some new matter in their course, it may be hoped that they will have the further courage to test the newer methods that are now available and adopt them in their teaching. E. J. R.

SCIENTIFIC EGYPTOLOGY.

(1) *Service des Antiquités de l'Egypte. Catalogue Général des Antiquités Egyptiennes du Musée du Caire.* Nos. 61,051–61,100: The Royal Mummies. By G. Elliot Smith, F.R.S. Pp. vii + 118 + 103 plates. (Le Caire: Imprimerie de l'Institut Français d'Archéologie Orientale, 1912.)

(2) *British School of Archaeology in Egypt.* Studies Series. Vol. iii. The Formation of the Alphabet. By Dr. W. M. Flinders Petrie, F.R.S. Pp. iv + 20 + 9 plates. (London: Macmillan and Co., Ltd., and Bernard Quaritch, 1912.) Price 5*s.* net.

(1) PROF. ELLIOT SMITH'S studies of mummification, the result of work carried out during the years he spent in Egypt,

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have been brought to a fitting conclusion by the issue of this sumptuous catalogue of the royal mummies in the Cairo Museum. The work forms an exhaustive supplement, from the anatomical side, to Sir Gaston Maspero's monograph on the same subject. We meet with many old friends, but there is scarcely one about which the author has not something new to tell us. The earliest and perhaps the most tragic of these dead kings is the seventeenth dynasty Pharaoh Seqenen-Ra, whose agonised hands and battered face and skull bear witness to a violent death upon the field of battle. We note that Prof. Elliot Smith supports Maspero's view that the body was hastily mummified on the field, not transported to Thebes and subjected to partial decomposition, as Dr. Fouquet would have it. Another interesting mummy, or rather skeleton, is that of the heretic King Akhenaten, which was found five years ago by Mr. Theodore Davies in the tomb with Queen Tii's furniture, and was at first supposed to be that of the queen herself; we are glad to have the anatomical evidence as to age, &c., set forth in greater detail.

A subject of controversy on which these important researches throw new light concerns the influence which, it has been supposed, phallic ideas may have exerted on the technique of embalming in Egypt. The evidence against the theories appears conclusive, and cases quoted in support, such as the mummy of Rameses II., can be otherwise explained (see especially p. 61).

It is perhaps scarcely necessary to add the warning that the catalogue is for the scientific, not the general reader, who would find that much of it reads like a detailed report of a series of post mortem examinations; some of the photographs, too, though of the greatest possible value for the anthropologist, are naturally rather gruesome. But, as Prof. Elliot Smith justly remarks, since these valuable historical "documents" have come into our possession (mainly, it may be added, through the depredations of ancient Egyptian grave-plunderers), it is the duty of the man of science to read them as fully and as carefully as possible.

(2) In his latest work, "The Formation of the Alphabet," Prof. Flinders Petrie has given us fresh proof of his versatility. De Rougé's theory of the derivation of the Phœnician alphabet from the Egyptian hieratic writing of the twelfth dynasty is now generally discarded, and some ingenious theories have within recent years been propounded in its place. Prof. Delitzsch, of Berlin, for instance, has worked out for it an elaborate cuneiform ancestry; while Prof. Sayce has more recently suggested a purely Semitic source in Syria. Prof. Petrie holds that, instead of coming into existence as a small alphabet, enlarged and corrupted by later additions, its evolution was spread over a far greater area and longer period. It had its origin in a gradually formed signary, current far and wide throughout the ancient world, until it was slowly contracted and systematised. Thus the majority of the signs Prof. Petrie would trace back to a remote antiquity, no fewer than forty-four of his sixty elements beginning with pottery-marks in prehistoric Egypt. We have not space to discuss this very attractive theory in detail, but we would suggest to the professor in quite general terms the possibilities of fortuitous resemblance in cases of parallelism where the lines of cultural contact seem remote. L. W. KING.

PHILOSOPHY AND ETHICS.

(1) *The Dynamic Foundation of Knowledge.* By Alexander Philip. Pp. xii+318. (London: Kegan Paul, Trench, Trubner and Co., Ltd., 1913.) Price 6*s.* net.

(2) *High-School Ethics.* Book I. By J. Howard Moore. Pp. xiv+182. (London: G. Bell and Sons, Ltd., 1912.) Price 2*s.* 6*d.* net.

(3) *The Positive Evolution of Religion: Its Moral and Social Reaction.* By Frederic Harrison. Pp. xx+267. (London: William Heinemann, 1913.) Price 8*s.* 6*d.* net.

(4) *The Value and Destiny of the Individual.* The Gifford Lectures for 1912. Delivered in Edinburgh University. By Dr. B. Bosanquet. Pp. xxxii+331. (London: Macmillan and Co., Ltd., 1913.) Price 10*s.* net.

(1) ENERGY is the real thing, not matter. The keynote of philosophy is change. Sensation is not sensation of thing changing and of change; it is simple consciousness of change. Change implies power. All science is an interpretation of appearance in terms of power, which is the fundamental postulate. And our notion of power arises from our awareness of our own motor activity, which awareness is one of the first data of experience. Causation is a derivative postulate arising from this same awareness of self-activity; if we were passive photographic plates, we could have no conception of causality. We attribute potent efficacy to the things of sense which resist us, on the analogy of our own activity.

Philosophic systems come and go, as did theological discussions in their mediæval day; but the hope of the future is in the triumph of science. It offers the clue, viz., "to conceive of things in terms of their organic potency."

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